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TI : Latest Results from the Mars Pathfinder Atmospheric Structure/  
Meteorology (ASI/MET) Investigation.

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AB: When the Pathfinder spacecraft entered the atmosphere of Mars at 3am on 4th July 1997, it carried an Atmospheric Structure Investigation/Meteorology (ASI/MET) experiment designed to measure the vertical structure of the atmosphere during entry, and. to obtain a surface meteorological record for the duration of the Pathfinder landed mission. ASI/MET worked perfectly throughout the mission and is still returning data from the surface of Mars today (3rd September 1997, Pathfinder Sol 60) . This paper reviews the new atmospheric data from ASI/MET, including the latest results from the surface, and compares these data with the results of the Viking landers taken 21 years earlier. Below 60 km the vertical atmospheric temperature structure is similar to that recorded by Viking, although a temperature inversion at 10 km may mark the water ice cloud condensation level. Above **60 km**, the Pathfinder profile is on average **20 K** cooler than Viking, due primarily to time of day effects. At 80 km, the temperature dips as low as 90 K, which is below the saturation temperature of c02 at this level, and it is possible that C02 ice clouds may form. The surface, pressure, temperature and wind record from Pathfinder for the northern hemisphere late summer and fall is broadly similar to that returned by Viking 1 for the same season. This is not unexpected, as both spacecraft landed at almost the same latitude and altitude. Pathfinder measures pressure with more than 100 times the precision of Viking revealing a wealth of detail in the diurnal variation. The annual pressure minimum occurs within a few days of that seen by Viking Lander 1 (VI-1) and there is little synoptic variability in the first 60 days. The amplitude of the semi-diurnal pressure tide suggests that dust is well distributed globally and vertically. Day-to-day temperature variation at the surface is small, but Pathfinder temperatures at 1.5 m are 10--13 K warmer, both day and night, than VI-1, because of the lower albedo and larger thermal inertia of the surface. Short term temperature fluctuations of 15-20 K, produced by large vertical temperature gradients, are seen during the day. Pathfinder winds in late summer

rotate clockwise through the compass points during the day, like VL-1, but appear to be controlled by local slopes. Maximum winds of 5-10 m/sec blow from the south at night, down the Ares Vallis canyon system. Nighttime winds are often correlated with positive excursions from the temperature cooling curve at night, as the stably stratified surface layer is disturbed. Dust devils are 'seen' passing almost daily over or near the Pathfinder landing site. The signature of these vortices is clearly revealed in short lived pressure minima of up to 50 microbars amplitude, together with correlated wind and temperature variations. Dust devils may be a major source of atmospheric dust at this season.

**Sc:** P

DE: Pathfinder

DE: ASI/MET

DE: Atmosphere

MN: 1997 Fall Meeting